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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|-----------------------|------------------|
| 09/819,952 | 03/29/2001 | Toshiya Uemura | P 277993 F00-242-US | 2938 |
| 21254 | 7590 | 03/05/2004 | EXAMINER | |
| MCGINN & GIBB, PLLC 8321 OLD COURTHOUSE ROAD SUITE 200 VIENNA, VA 22182-3817 | | | BAUMEISTER, BRADLEY W | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2815 | |

DATE MAILED: 03/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/819,952

Applicant(s)

UEMURA ET AL.

Examiner

B. William Baumeister

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 November 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4,6,8,10,12,14,15,17,19,24,26,28,30 and 38-44 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4,6,8,10,12,14,15,17,19,24,26,28,30 and 38-44 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
2. Claims 1, 6, 8, 12, 14, 15, 19, 24, 26, 28, 30 and 38-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morita et al. '636 in view of JP 11-126923.
 - a. Morita discloses III-N light emitters formed on a sapphire substrate and having an emission layer 9. Morita discloses that the rear side of the sapphire substrate may further have a reflective film 11 composed of various metals such as gold (e.g., col. 5, line 14), or multilayer films of metal (e.g., col. 2, line 22). Morita further discloses that if the rear surface of the sapphire is not sufficiently smooth, a light transmissive smoothing film, which can be made of various materials such as SiO₂, can also be employed between the substrate and the reflector (col. 5, lines 18-23). Morita discusses the structure of an LED chip that has been singulated, and as such does not discuss the details of its intermediate structure prior to singulation.
 - b. JP '923 teaches GaN-based LED chips and various intermediate, pre-singulated structures. See e.g., FIGs 5-7 wherein the wafer includes split lines 21 and opposing separation grooves 22. A reflection film 10 is formed over the rear-substrate surface including the split lines. It would have been obvious to one of ordinary skill in the art at the time of the invention to have provided within the Morita wafer prior to singulation,

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split lines and separation grooves and to have employed an adhesion sheet as taught by JP '923 for the purpose of improving the chip-dicing process as taught by JP '923.

c. Regarding the claims that set forth particular thickness ranges (e.g., claims 6, 12, 14, 15 19 and 24) Morita discloses all of the claimed elements other than the split lines, but does not appear to further disclose any potential thickness ranges for these layers such as the reflective layer, the light transmission layer or the substrate. Nonetheless, and regardless of whether JP '923 discloses these dimensions, it would have been obvious to one of ordinary skill in the art at the time of the invention to have formed these respective layers to thicknesses that are within the very broadly claimed ranges because thicknesses within these ranges do not produce any unexpected results and also for the purpose of optimizing their respective effects for their respective intended uses. Further, Applicant's specification acknowledges that these claimed thicknesses do not produce any unexpected results, but rather, that the limitations are based on goals that were well known in the industry: if the layers were made thinner they would not adequately perform their intended functions, and if made thicker they would be unduly wasteful/costly (see e.g., specification paragraphs (0057) and (0059). Also, since Morita is a US Patent, and the disclosure has a presumption of validity, and therefore the invention is presumed to operate as intended, the layers would therefore necessarily at least be thicker than the claimed minimum thicknesses or they would not work as intended. With regard to the larger thickness limit, minimizing material and processing costs was a well-known industry goal at the time of the invention.

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3. Claims 4, 6, 10, 12, 14, 15, 17, 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morita '636/JP '923 as applied to the claims above, and further in view of Steigerwald GB 1899.

a. Morita discloses that various metals may be used for the substrate reflector, but does not expressly disclose that Al or Ag may be one of these metals.

b. Steigerwald discloses III-N LEDS 16 formed on a sapphire substrate 12 with a semitransparent contact (emission) layer (see FIG 1). On the backside of the sapphire substrate is formed a mirror structure composed of a reflective layer 14 that may be composed of various metals including Al, Ag or Au of thickness with in a range including about 50 - 250 nm (see FIG 4). More strictly the specification recites that the reflective layer has a lower thickness limit of about 20 nm for Ag and Al to ensure that the reflectivity is sufficient (page 5, lines 24-28). An optional non-absorbing adhesion layer 10 may also be interposed between the reflector 14 and the substrate. Any thickness (minimum thickness of one atomic layer) may be used for the adhesion layer so long as it promotes adhesion and does not reduce reflectivity (page 6, lines 10-16). It would have been obvious to one skilled in the art at the time of the invention to have substituted either Al or Ag for the Au reflective layer of Morita because Steigerwald teaches that these metals are more highly reflective of certain III-N wavelengths and for the purpose of reducing manufacturing costs since Ag and especially Al are less expensive than gold.

Response to Arguments

4. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

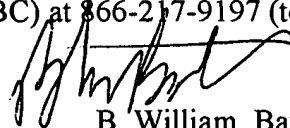
- a. Shibata et al. '927 is listed in the USPTO PALM database as claiming priority to the JP '923 reference cited above and serves as an English translation thereof.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to B. William Baumeister whose telephone number is (571) 272-1722. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

**BRADLEY BAUMEISTER
PRIMARY EXAMINER**



B. William Baumeister
Primary Examiner
Art Unit 2815